are susceptible whose parents never were poisoned. Many rub themselves with the baneful leaves without the slightest injury. Mulattoes and negroes, light and dark complexions, appear equally susceptible. This susceptibility recedes as age advances. By simple contact with the vine or bush, we do not always contract the disease; but boys subject to it, who run through meadows, get their feet scratched, and then touch the vine, generally pay dearly for their temerity.

I should be pleased to have the question solved, why some handle with impunity what will so soon severely punish others. Can it be possible, that some peculiar structure of the cuticle, or rete mucosum, constitutes this idiosyncrasy? I have sometimes thought that children, in the maximum of animal life, were more obnoxious to the poison than those of lower rank in the vital scale. I do not recollect of ever having seen a pale looking person poisoned, at the same time, however, many vigorous habits are not susceptible.

I have just learned that Dr. Hobson of New York, some time since, published a small work on this subject, and that it is his opinion, that the disease is seated in the rete mucosum. With this view I coincide, for were the skin the seat, and the mucous surfaces only different, by being so alive to impressions, so quick in their organic perceptibility, the great extent of their sympathies, &c. we should often have it in the form of pneumonic, gastric, or enteritic inflammation. I have seen the eruption spread to the corners of the mouth, but no farther, not even within the verge of the epithelium.

Art. XI. *On Hydrorachitis, with Cases.* By Solomon Temple, M. D. of Philadelphia.

Hydrorachitis, though not a very common disease, is of sufficient importance to claim attention It is a dropsy within the spinal canal, and is usually congenital; commencing, in all probability, in the first months of uterine life. At birth it is characterized, in most instances, by a livid spot seated upon some portion of the spinal column, and most frequently in the lumbar region or on the sacrum. This spot very soon becomes elevated, and conveys to the touch an evident sense of fluctuation. The tumour either ruptures at this period and discharges a fluid, usually transparent and resembling serum, but sometimes thick, flocculent, and turbid; or it increases gradually and sometimes attains an enormous bulk. On some occasions the tu-

mour is ruptured during parturition, and cases have occurred wherein no tumour existed, or if it had ever formed must have ruptured a long time previous to birth. When the tumour has remained entire for some days after birth, the integuments, yielding to the pressure of the fluid within, often become thin, and sometimes translucent, exhibiting the sub-cutaneous vessels minutely and beautifully injected. In some instances the skin retains its natural thickness, and in others it is rugose and thicker than usual. Most frequently there is a defective ossification in the vertebræ subjacent to the tumour, but it generally consists in the absence of one or more of the spinous processes, the remainder of the bones being perfect. In some rare instances, the transverse processes and bony bridges are wanting, and still more rarely the bodies themselves. Oken, in his account of spina bifida, alludes to cases wherein there was no deficiency of bone.

These are the characters usually presented by this species of dropsy. It is often connected with hydrocephalus, probably nearly always where it continues any length of time. Sometimes there is paralysis or distortion of the lower extremities, attended by constipation or diarrhœa, and strangury or ischuria, or there is an involuntary discharge both of fæces and urine. Some patients are extremely debilitated, others on the contrary are healthy and vigorous, and in a few cases remarkably lively and active, as I have witnessed in one instance. Few subjects of this disease survive many months; of the two which I have seen, one lived eight and the other four months. Instances are, however, recorded of patients living several years, and even to adult age.

The essential characteristic of this species of dropsy, is its connection with the cavity of the spine; and where it appears as an external tumour, there is always a direct communication with this cavity. When entirely confined to the spinal cavity, I know no means of determining its presence with certainty: the occurrence of the symptoms mentioned above may induce us to suspect its existence, particularly if they are combined with hydrocephalus or club-foot.

Although this is properly considered as a congenital disease, yet instances are related wherein it did not occur until a few days after birth. Lancisi asserts that he once saw a case, in a child with hydrocephalus, in which the disease did not appear before it was five years old; and J. Louis Alpin, that he witnessed a case in which the tumour did not make its appearance until the age of twenty years, but these are exceptions of no practical importance; in all probability the last two arose from hydrocephalus or from accidental injury.

The speculations of most authors upon hydrorachitis are based upon

an erroneous pathology of the disease, and their writings are only valuable for the facts which they contain. It is a circumstance somewhat singular, that a disease which must in all probability have existed in the earliest ages, did not apparently engage much attention until a period comparatively very recent. Little notice appears to have been taken of the disease previous to the time of TULPIUS, who gave some description of it; but neither did he, nor any author of that period do more than call the attention of surgeons to the subject.

RUYSCH, whose rigid analytical inquiries have enriched various departments of medical science, seems to be the first who apprehended the real nature of the disease. He called it a dropsy of the medulla spinalis, and was, I have no doubt, led to this conclusion from inspecting the kind of lesion which attended it, and the qualities of the effused fluids. He says, "If we examine this swelling judiciously, it will appear as clear as day that it is a dropsy of a part of the spinal marrow, and is almost the same disorder which, when it is seated in the head of an infant, is called hydrocephalus."* The investigations of this distinguished anatomist were made about the close of the seventeenth century, and afforded a clue to the correct pathology of the disease, but I am not aware that it was ever fully pursued. Subsequent writers have viewed it as the consequence of a lesion of some part of the bony structure forming the vertebral canal, and have contributed to perpetuate the use of the term by which it has been erroneously designated, and which alone is intelligible to most medical men at the present day. It has rarely been suggested that the deficiency of bone may have been a consequence rather than a cause of the disease. Dr. UNDERWOOD was aware of the importance of Ruysch's observations, and mentions, rather hesitatingly, the real cause. I shall endeavour to show that the disease is coeval with, or anterior to, the formation of bone in the fœtus, and probably anterior to the cartilaginous form which bones assume, intermediate between their gelatinous condition and the deposit of bony matter. I shall, for the present, confine myself to that variety of the disease which manifests itself by a tumour at the lower portion of the vertebral column, as I have had no opportunity of examining others, and the dissections heretofore made are not sufficiently minute to warrant deductions from them. In these cases there was probably a displacement of the lower portion of the medulla from a distention of its membranes, which must have occurred while the parts were yet soft and yielding. In the natural state this portion projects into that part of the

* Van Swieten's Commentaries, Vol. XII. page 249.

gelatinous mass which represents the sacrum, but in this disease it bursts through the substance in which it was enveloped, and which was to constitute the rudiment of the bony case designed to cover and protect it. As the process of ossification advances no channel or canal is left for its accommodation in the sacrum, which its presence in that portion would have secured, and it is therefore finally excluded. One reason for supposing the disease to originate anteriorly to the formation of bone, is that the foramina in the sacrum are perfect, in their proper places, and actually occupied by the nerves, although these come from the inferior portion of the hydrorachitic sac, which could not have happened if the lower portion of the medulla had been recently protruded through the opening in the spine.

Even if the distention were not sufficient to rupture the envelopes of the spinal marrow, its chief force would be directed towards the posterior or least resisting part, and by its pressure as effectually prevent the ossific process. Extending this view to other portions of the spine, and comparing it with the effects of serous effusion within the cranium, its ready application to every variety of hydrorachitis is obvious. But whatever may be the period at which this deficiency of bone occurred, we have every reason to believe that it is subsequent to, and caused by, the hydropic effusion. For in the cases recorded, we have no evidence either from the symptoms, or from post mortem examination, that any cause for this deficiency existed primarily in the part: and, from analogy, we are warranted in concluding, that the presence of a foreign body hinders the natural process of ossification as well as of other functions. The inference therefore is, that the original cause of the disease, whatever it may be, is located within the canal.

Considering the disease as a dropsy, as a collection of fluid within the canal, we can readily conceive the possibility of its obstructing the deposition of bony matter, precisely as in hydrocephalus, the bones composing the cranium are scarcely ever of a natural size in any of their dimensions, and in some instances, where an attempt seems to have been made towards the formation of bone, there is a great deficiency of calcareous matter. The cranium in such cases is thin, flexible, and scarcely differing from cartilage; or it is sometimes interspersed with small stellated patches of bony matter.

From reflecting on the character of this disease, I had early adopted the opinion, that the deficiency of bone arose entirely from the pressure of the fluid, preventing the deposition of bony matter, and an instance which furnishes negative evidence of this fact, is reported by Dr. Vose of Liverpool, in a case of hydrocephalus cured by

puncture. In this case the cranium is represented to have been a thin membranous bag; but on removing the pressure occasioned by the fluid, a rapid secretion of bone succeeded.

As hydrorachitis is not necessarily subsequent to, or accompanied by any other disease, adequate to the removal of bone by promoting its absorption, I conclude that there could have been no vacuity in the bony structure antecedent to the internal disease, and whatever lesion may have occurred, must have been a consequence, and not the cause of the disease. The absence of a portion of bone, although it may possibly give rise to hernia, cannot, I apprehend be the cause of a dropsy that originates in a structure with which it has no connexion. The arachnoid membrane which secretes and encloses the fluid has no connexion with the vertebræ, and in a hernia of the medulla would be more likely to be ruptured than to commence the effusion of a serous fluid. Bertrand, in 1786, about a century after the more accurate observations of Ruysch, called the disease a hernia of the medulla spinalis. It is difficult to ascertain precisely whether he referred to the disease in question, or to hernia of the spinal marrow, which, according to Hunter, Underwood, and others, sometimes occurs, but which is totally different from dropsy. It is in every important character closely allied to hernia cerebri, and has the same relation to it that hydrorachitis has to hydrocephalus. It is probable that Bertrand never examined carefully a case of spinal arachnoid dropsy, or he would have discovered that it possessed none of the characters of hernia.

Direct and natural as these inferences appear, they are generally admitted only in theory, and indeed the opinions and practice of high authority in Europe, have been predicated on the supposition of a primitive defect in the spine as a cause of this dropsy; for, within twenty years, the disease has been professedly viewed and treated by a surgeon of eminence as a hernia. This idea arose, I have no doubt, from the erroneous term by which it has been designated, without giving due attention to the nature and seat of the complaint.

A previous deficiency of bone may be a necessary condition of hernia, whether it be of the spinal marrow or of the brain; but arachnoid dropsy, either of the brain or of the medulla spinalis, may occur without a deficiency of bone or any external evidence of its existence. Fungous excrescences may arise from the meninges or substance of the brain, or of any other part of the central portion of the nervous system, resembling hernia, or an accidental protrusion of a portion of the subjacent organ, but there is no evidence that these excrescences ever have their origin in the serous tissue.

The term spina bifida, although I doubt the propriety of its application to any of the diseases of the spine, may possibly be appropriate in hernia, or fungous excrescences from the dura mater, or periosteum of the vertebræ, but it expresses no one circumstance or symptom of the disease which it is meant to designate. It applies to a state of things which may accompany it, or may exist without it. A mere accidental character of the disease, therefore, and one which is by no means a constant attendant, should, I think, no longer give a name to, and a false idea of an affection with which it may be associated, but is not necessarily connected. A bifurcated spine is, so far as I can ascertain, an extremely rare attendant of spina bifida.

A deficiency of some of the spinous processes, or their entire abscence, in one or more of the vertebræ, is said to be very common in this disease, and on some occasions no doubt communicates the impression when superficially examined, that the spine is divided at that part; but whether this defect in the bony structure of the canal is a cause or a consequence of the dropsy, it is manifest that it merely furnishes an outlet to a portion of the membranes distended by the hydropic effusion. An ignorance of the real nature of the disease, undoubtedly gave rise to the term, and its continuance can only tend to perpetuate the mistaken views which gave it origin.

Although considered as a dropsy, I believe its particular location has not been pointed out. Its source is the spinal portion of the arachnoid membrane, and its seat is the cavity of which this membrane forms the lining. The older writers do not seem to have apprehended that a peculiar tissue was appropriated to the secretion of serum, or that a disease of this texture resulted in the effusion of a fluid superabundant in quantity, or vitiated in its qualities. They were in a great measure unacquainted with the fact, that the characters of diseases were modified by the texture which they occupied, while the morbid agent remained the same. They were not ignorant of the existence, the usual causes, and mode of relieving or curing the more obvious forms of dropsy, but a knowledge of the functions of various structures was wanting, to enable them to arrive at a correct pathology of the disease in any of its forms, and more especially in those which are limited to particular cavities of small extent. It is not therefore surprising that one species of arachnoid dropsy should, from its location, be distinguished by a term referring to lesions of the solid parts, occasioned by a morbid action of this membrane, when neither the extent nor the functions of the membrane were known. To Bichat we are indebted for a full demonstration of this membrane in particular, and for a more satisfactory elucidation of the

functions of membranes generally, than had hitherto appeared. The source of dropsy, according to this truly classical anatomist, is to be sought in a derangement of the functions of the serous or cellular tissues. The present theory of dropsy, as deduced from this view of the anatomical structure, has been amply developed by Professor CHAPMAN, and may be considered as established. A detail of his inquiries on the subject, and his highly important practical observations is given in his valuable paper on Hydrocephalus, in the Philadelphia Journal of the Medical and Physical Sciences, New Series, Vol. IV. page 298. It not being my intention to embrace a view of general dropsy, it is sufficient to state, that he refers it to a diseased action of the exhalents, without necessarily involving the absorbents.

I have alluded to the relation which subsists between hydrorachitis and hydrocephalus. Authority on this subject is profuse, but as on every other point in relation to hydrorachitis, too much has been left for conjecture.

All the cases related by Sir ASTLEY COOPER, in which he refers to coma as a consequence of pressure on the spinal tumour, evince the connexion which subsisted in the disease between the brain and the spinal marrow. OKES refers in a note to a case communicated by Mr. WASHBOURN, a surgeon at Marlborough, wherein pressure on the tumour distended the fontanelle, and vice versa. One of the cases which I had an opportunity of examining, furnished me with positive evidence on this point. After removing the fluid effused into the ventricles of the brain, one of which was enormously distended, that contained in the hydrorachitic sac could be readily transferred to the same cavities by merely elevating the inferior portion of the trunk.

WEPFER mentions a case, which, from its location, and its consequences, would seem to be different from arachnoid dropsy of the spinal marrow, but since it is recorded as a case of spina bifida, and certainly was either immediately or remotely connected in some way with the head, deserves to be noticed. He says he knew a girl who was born with a livid spot, five inches long, and three inches broad, situated on the right side of the upper lumbar vertebræ. The tumour was soon elevated more than the thickness of the little finger. A surgeon opened it, and a limpid serum issued from the orifice; when about three ounces were discharged, he closed the wound which readily healed. The tumour afterwards arose, and the mother opened it six times by scratching it with her nails, and each time about three ounces were discharged. These wounds the surgeon had no difficulty in healing, although they were very unscientifically inflicted. When the wounds were healed, and the lacerated surface was cicatrized

over, and no tumefaction of the part remained, a swelling appeared first on the "right frontal bone," and then on the left, and finally extending to the parietal and other bones, developed a case of well-marked hydrocephalus; and there was an enormous increase in the size of the head.

Van Swieten, in the twelfth volume of his Commentaries, page 251, remarks in reference to this case, "perhaps the lymph descends from the ventricles of the brain." This I consider a matter of no consequence, as effusion may take place in any part of the cavity lined by the arachnoid membrane: but in the case alluded to, there is no evidence that any communication existed between this cavity and the tumour, and although evidently connected with parts exterior to the substance of the brain, it is by no means certain that it was a case of arachnoid dropsy. Its position on the side of the vertebral column, its appearance and progress, connected with the tumefaction of the scalp, would induce the supposition that the effusion was from cellular membrane, and bore a stronger resemblance to local anasarca than to hydrorachitis.

However this may be, it is certain that dropsy of the spine is seldom elsewhere located than on the middle line of the vertebral column, and with a very few doubtful exceptions at the junction of the last lumbar vertebra with the sacrum. A case mentioned by Warner, Cases in Surgery, page 125, appears to me to have been hydrocephalus. He says he saw a tumour on the occiput precisely resembling those which occur on the spine. Although in this case, the occipital bone was almost wholly defective, yet the child was lusty and strong, and there was no visible disease of the limbs. He advised nothing but palliatives; the tumour was, however, opened by another surgeon, and the child died in a few days.

It is important to distinguish with greater accuracy than has hitherto been done between hydrorachitis and diseases which bear a general resemblance to it. My acquaintance with parenchymatous tumours on the spine, as they are called by Underwood, with herniæ or fungi of the medulla spinalis, is too limited to enable me to describe with precision the best modes of distinguishing them from the tumour in hydrorachitis; but in the latter disease there is an effusion more or less resembling serum within the spinal cavity, and most probably within the cavity lined by the arachnoid membrane; the tumour, which is generally present, is soft, fluctuating, and elastic; it is mostly diaphanous, and always has a direct communication with the vertebral canal. In the tumours which resemble it, none of these characters usually obtain; their connexion with the interior of the

canal is doubtful, they are never elastic, and excepting in cases of hernia, always arise exteriorly to the dura mater, or from this membrane.

When the tumour is seated at the base of the sacrum, which appears to be its proper location, as it is rarely found in any other position, there is a diagnostic mark which I consider more important than any above mentioned, and which, so far as I could discover, has never been before noticed. It is a spot at the most projecting part of the tumour, of a firmer consistence than any other portion of its parietes, and which, from its appearance, and the circumstance of a small quantity of fluid issuing from it soon after the birth of the child, I had regarded until lately as the cicatrix following a spontaneous or accidental rupture at the part. But it marks the termination of the spinal marrow, which is proportionately longer in infancy, and owing to its displacement at an early period, as was before observed, extends with the branches composing the cauda equina, to the apex of the sac, where their filaments are apparently lost in the firm flesh-like substance alluded to. The sacral nerves spring from this substance as from a second point of origin, and in the dissections hereafter detailed, I was not able to trace their connexion with the descending filaments from the spinal marrow. Neither the spinal marrow nor its immediate branches appear to have any determinate connexion with the sides of the tumour, until they reach the apex, although I have met with adventitious adhesions slightly uniting them to each other or to the walls of the sac, which were probably the result of inflammation in the arachnoid membrane. The importance of this view of the anatomical arrangement of parts will be referred to when noticing the modes proposed for alleviating or curing the disease.

I shall now give a short detail of the two cases, which fell under my observation, and first drew my attention to the disease.

Case I.—W. G. born May 22d, 1826. The mother stated, that at the birth of the child, a livid spot was observed on the lower part of the back, and the midwife informed her that "a joint was missing." The spot became tumid in a few days, and a watery fluid was perceived to exude from the upper part of the tumour, by a perpendicular fissure which soon closed. When I first saw him he was more than two months old; a large boy, and his general aspect very healthy. My note made at the time states, that a tumour presented apparently at the base of the sacrum, or possibly over the upper part of it, of a cordate form, and about two inches and a quarter in length,

by two inches broad, and elevated in the middle more than half an inch. Its general colour was reddish, in consequence of being traversed in every direction with red streaks, the ramification and anastomosis of minute vessels, somewhat resembling a thin bladder distended with blood and water, imperfectly intermingled. There was a cicatrix precisely in the middle where it had been open, and which seemed to give it the heart shape which it presented. On pressing with the finger on the place of the spine, at the edge of the tumour, I could not perceive any deficiency in the vertebræ. As I did not know at that time the residence of the child, it was nearly two months before I saw him again. At this time the tumour was very large; its horizontal diameter at the base about three inches and a half, the perpendicular nearly three inches, and the elevation above the surrounding integuments about two inches. Its appearance is nearly as before, but I think not quite so diaphanous. It is obviously increasing in size, as a part of the sound integuments are elevated, and constitute a portion of the base of the tumour, which the mother says has always preceded its sensible enlargement. They are first elevated, then appear inflamed, and afterwards assume the diaphanous appearance of the other part of the tumour. The pulsation of the aorta is distinctly felt at the upper edge of the tumour. There is no paralysis, nor any symptoms of hydrocephalus, the excretions are natural and voluntary, and the child is robust and active, and, in short, there is full evidence of perfect health, and of a healthy conformation, excepting in this particular. He is now about four months old. In this situation he continued many weeks, without any other change than a gradual increase in the size of the tumour, and the consequent progress of the disease. I saw him occasionally, but was called, January 26, 1827, and found that the tumour had commenced ulcerating about the 14th, attended by a very slight fever, not sufficient to create any alarm. The tumour is about fourteen inches in circumference, the integuments surrounding it are red, as from inflammation, forming a ring about ten lines in breadth, nearly all around the tumour, with a margin pretty well defined. This redness disappeared next morning, but occurred occasionally for two or three days. The ulceration appeared to commence and extend to the greatest depth, where the old cicatrix remained in the centre, probably in consequence of a thickening of the integuments in this part from previous ulceration; as the walls of the sac are thicker here than elsewhere, and appear less vascular. The ulceration of the integuments daily progresses, but not very rapidly, his strength has diminished, he is pale, but has not lost much flesh; he takes his food with

some avidity, but occasionally deglutition has been rather difficult for a few days, and he cannot readily take the breast.

February 2d.—A small quantity of fluid has, at various times within the last week, issued from different parts of the ulcerated surface; but to-day, the tumour ruptured, and after two or three ounces had been discharged, I reapplied the dressings, to prevent a further flow at that time. The dressing was a simple cerate, and employed chiefly to protect the tumour. The ulceration has extended nearly over the whole surface: it completely occupies the central parts, and has considerable depth at the upper part. The discharge has continued gently through the day and evening. Pulse about 180 in the minute.

February 3d.—To-day the sac suddenly discharged most of its contents: I saw him soon: the depression was considerable, but not so great as I had expected. The pulse was weak, and about 200. The collapse of the tumour showed a deficiency in the spine, the vacuity large enough to contain a pullet's egg. At this time there are symptoms of cerebral effusion. A small quantity of fluid issued from his eyes. The pulse is very weak, and upwards of 200.

February 4th.—The sac is again filling, and when distended, the skin is warmer, and the pulse more frequent. The stools are greenish, and their passage has given him pain, for several days past. The urine is passed involuntarily. His eyes do not appear to be entirely insensible to the action of light, but its impression is doubtful. I noticed that his pulse was subject to sudden alterations, which appeared to have some relation to the quantity of fluid in the sac; the discharge of which, on account of the extensive ulceration, could not be controlled. On one occasion, when his pulse was certainly much above 200, I drew off, from estimation, one ounce of the fluid, and immediately found his pulse 180, and fuller than before. It soon afterwards rose.

Irregularity in the discharge of fæces and urine, as well as in the circulation, continued. The temperature, both of the superior and the inferior extremities, varies, and they exhibit a little convulsive agitation. This agitation continued, and increased until death, which occurred this evening. A few hours before death his breathing became very laborious, and he was unable to swallow. Considerable quantities of flocculi, resembling coagulated lymph, were mingled with the fluid discharged yesterday and to-day.

A post mortem examination was made, February 5, in which I was assisted by Dr. J. R. Barton and Dr. J. W. Ash, and the preparation procured, from which the annexed drawing was made. See

plate I. Dissection presented the following appearances. On exposing the cavity of the sac, it was found to be, in part, occupied by the lower portion of the spinal marrow, and the cauda equina, which entered it by an opening beneath the last lumbar vertebra, occasioned by a deficiency in the posterior part of the sacrum, in which the spinous processes were wanting. On each side of the middle line of the sacrum, on its posterior face, was a ridge of bone, the commencement, or abutments, of the bony arch, which, in the healthy condition, encloses the sacral nerves and the prolongation of the medulla spinalis. The lower anterior portion of the sac lay in contact with these ridges and the space between them. The opening by which the sac and its contents communicated with the spinal cavity, would barely admit the point of the little finger. The lumbar vertebræ were natural. The sac consisted of the distended dura mater, covering the spinal marrow, lined by arachnoid membrane, which was reflected over its internal face, and also covered the medulla spinalis and the nerves. The medulla spinalis and the nervous cords descending with it, passed freely through the neck of the sac, and, after forming a membranous expansion, became united to the dura mater at the apex of the sac. Their insertion occupied a space of about half an inch in diameter, in a thick, firm substance, of an inch in diameter. The nervous filaments could not be traced through this substance, but surrounding the insertion of the descending branches, and entirely distinct from them, certain nervous filaments arose, first in minute shreds connected by a delicate membrane, then coalescing into slender cords, formed, as they emerged from the cavity of the sac, two cords only, one of which had a ganglion; and here the two nerves united into a single trunk. These ganglia in the sacrum were situated in the foramina of the os sacrum; those of the twenty-third and twenty-fourth pairs of nerves, after their component cords had passed through the inter-vertebral foramina. I supposed the ganglionic nerves were similar to those arising from the posterior columns of the spinal marrow, and therefore called the two anterior and posterior fasciculi, although I could not, excepting in the case of the twenty-third pair, trace their connexion with the descending branches. The anterior and posterior fasciculi had distinct origins in the firm substance above alluded to, and in a few of them separated to a considerable distance. The nerves above the twenty-third, arose in the usual way, but the posterior branch of this nerve arose from the firm substance at the centre of the sac, while the anterior, descending nearly to the central point, and detaching a slender filament to it, returned at an acute angle to its proper foramen. This occurred only

on the right side. All the parts presented marks of inflammation, but the inner face of the sac the least.

The firm substance at the apex of the tumour, was situated precisely beneath the perpendicular fissure previously mentioned, and I found that it constituted what I had supposed was the cicatrix, following the slight rupture of the integuments. The skin upon it is changed, and has become identified with the parts beneath; this, together with its hardness, rendered it easily perceptible during the life of the patient.

The sacral nerves in passing to their proper foramina, occupy chiefly the lateral portions of the cavity; a few of them lay near the sides, but most of them proceeded directly through the cavity. I regret that in this case the brain was not examined.

Case II.—A coloured child, about four weeks old, had a tumour on the base of the sacrum, its general appearance very similar to that above described, but it was more elevated, and the integuments were thicker. There was a circular spot on the apex of the tumour, three or four lines in diameter, much thicker and harder than the other parts. It was considered the cicatrix following a slight rupture, which the mother stated had taken place three or four days after the birth of the child, and from which she had observed a small quantity of fluid to issue several times. His form was remarkably handsome, particularly his head, which had not the shape peculiar to his colour. There was no symptom of hydrocephalus, nor any paralysis of any portion of the body.

In about a month I noticed considerable difficulty of breathing; it resembled snoring, and became so loud, at last, as to be readily heard in an adjoining room. General health apparently good; no paralysis; excretions free and natural; thought by the mother to be greater in quantity than natural.

A few days afterwards I noticed that the integuments over the anterior fontanelle and upper part of the os frontis, were slightly tumefied, as from the pressure of a fluid within. After this time the symptoms of hydrocephalus became daily more obvious, but the size of the spinal tumour increased very slowly, which was precisely the reverse of what happened in the case of W. G. During the last month of his life he had paralysis, with some distortion of the lower extremities, irregularity in the actions of the bladder and rectum, attended with repeated convulsions. He was four months old when he died.

A post mortem examination was made in which Dr. A. Comstock assisted me. As the appearances on dissection in this case were very

similar to the last, I shall only note the variations. The tumour was not more than one-fourth the size, yet the os sacrum was less perfect at its upper posterior part, and consequently the opening into the spinal cavity was larger: it would readily admit the point of the little finger. The spinal marrow and the cauda equina, terminated as in the former case, in a thick firm substance, but smaller. The sacral nerves arose in a similar manner; but in passing to their proper foramina, lay nearly in contact with the internal part of the parietes of the sac: they were invested, however, with arachnoid membrane, which was also reflected over the dura mater lining the sac.

A direct communication existed between the cavity of the sac and the ventricles of the brain, through the tube formed by the dura mater, and by way of the fourth ventricle, which was large enough to admit the finger. The ventricles contained nearly six ounces of a limpid fluid, of which three-fourths were found in the lateral ventricle of the left side, which was at least three times larger than that of the right. The fluid in the sac was similar to that found in the ventricles. The substance of the brain was not apparently altered. The disease appears to have affected the left side more than the right. The left testicle had not descended to the scrotum: it was found lying on the psoas magnus muscle, near its entrance into the pelvis.

That the external mark, indicating the relative position of important parts within, is not an uncommon occurrence, I think may be plainly inferred from many cases: I shall refer to two or three only.

Sir Astley Cooper's case of Mrs. Little's child, is one from which I should draw the inference. After a cure had been effected, he says, "the skin now hangs flaccid from the basis of the sacrum; its centre is drawn to the spine, to which it is united, and thus the appearance of a navel is produced in the tumour by retraction of the skin." Also the case of Hannah Jackman, reported by him, and one communicated to me by my friend, Dr. Henry Lee Heiskell of Virginia, were in my opinion, examples of the existence of this external mark. The latter I cannot describe better than in the words of his note.

"The case was that of a coloured child, four weeks old at the time I saw it, as large as children commonly are at that age. The tumour was between the last lumbar vertebræ and the sacrum, as large as a turkey's egg, perfectly diaphanous, and filled with a transparent fluid; its apex had taken on incipient ulceration. The space between the bones would admit the ends of the fingers. There was considerable distortion of the lower extremities, the legs and thighs being permanently fixed at right angles with the body; in addition to this, there

was distortion of the feet inwards." Dr. Heiskell had no opportunity of examining after death. The tumour remained entire.

The modes proposed for alleviating or curing the disease, are moderate and well regulated pressure, puncturing the tumour with fine instruments, the application of a ligature around the base of the tumour, and the excision of the tumour. The last need not detain us longer than to reprobate it. It never can be proper in hydrorachitis, however it may succeed in tumours which resemble it.

It is said that the application of a ligature has succeeded in the hands of a surgeon in Connecticut, but on inquiry I find the child continues paralytic as before. It is not, therefore, to be considered a cure, unless the child has since improved. The tumour sloughed away in due time, but it contained "something more than the integuments." On considering the nature of the lesion, it must appear evident that the application of a ligature would be highly injudicious in all cases similar to those which I have detailed. In the first case, all the nerves from the twenty-third to the thirtieth inclusive, would have been embraced by a ligature, and the consequences of its employment are readily inferred.

The only means, therefore, which can be safely resorted to, are pressure upon the tumour, and puncturing it with fine instruments.

The proper time for employing pressure, is at the moment the disease is discovered, and it should never be neglected by the accoucheur or midwife in attendance. It is then, in most cases, as above stated, merely a livid spot, and while in this condition, compression would afford a better prospect of success than at any subsequent period.

If this precaution has been neglected, gentle, steady and gradually augmented pressure, may still be employed, if the tumour be not large. It should not, however, be made with a block of plaster of Paris, as was ineffectually tried by Sir Astley Cooper, upon what principle I know not. Many better modes will suggest themselves to the surgeon; and that afterwards employed by himself is far preferable. That which I should adopt where the integuments are not yet elevated, would be, first to cover the part with a piece of oiled silk, and pass over this a broad muslin bandage, to encircle the body. I would then apply, as recommended by Cooper, a properly adjusted truss, similar to those used for umbilical hernia, with a regulated compress beneath the pad, which I think ought to be flat.

If there be a small tumour, I should cover it with the oiled cloth, and apply a bandage, without employing the truss, until I had succeeded in reducing its size, if this could be safely effected.

If the tumour be large, it is not probable that pressure alone will succeed; and it may indeed be productive of alarming, or even fatal consequences.

Under such circumstances, I think it would be justifiable to discharge the contents of the sac gradually, although you necessarily puncture the dura mater. Two cases are said to have been cured by this means, aided by pressure, by Dr. Bozzetti of Padua;* and although it has failed in the cases in which it was employed by Mr. Abernethy and Sir Astley Cooper, it was not productive of any immediate ill effects. Nearly forty years ago, the same measure was resorted to by Dr. Physick, for the cure of hydrocephalus, and subsequently by Dr. Glover of Charleston, Dr. Vose of Liverpool, and others; and if the results are not such as to make us very sanguine of success, at least they seem to show the propriety, when other means fail, (as the disease is necessarily fatal when left to nature,) of resorting to this. It is not to be expected, however, that operations of this kind shall prove equally successful with those employed in ascites, &c. The fibrous dura mater does not readily heal. The proper place, and the proper mode of performing the operation, are therefore matters of some consequence. If the view which I have given of the anatomical arrangement of parts has any value, it is in directing this operation.

As the nerves occupy the apex and the lateral portions of the sac, it is obvious that punctures should be made at the base of the tumour, either above or below, and near the middle line of the body. If the hardened spot, or cicatrix, to which I have alluded, should be situated low down upon the tumour, the puncture should be made above, but generally it would be better to make it below, as there would then be less risk of wounding the descending spinal marrow and nerves.

I would propose to make the puncture in the sound integuments with a fine instrument, properly curved, to avoid wounding important parts within the sac, inserting it three or four lines from the edge of the tumour, and elevating the point into its cavity. By this means the discharge of the fluid could be controlled, and the orifice readily closed. The operation should not be performed when the parts are inflamed, nor should the sac be emptied at once. The part should be supported, and even compression may be made to advantage, during the intervals. It may be proper also to try the effect of such internal remedies as are employed in hydrocephalus. I am aware that success has rarely followed any mode of treatment, but I think that an attempt to relieve or cure can generally be made with safety.

* See Vol. II. page 221, of this Journal.

Explanation of the Plate.

The drawing represents the sac opened by a perpendicular slit, a little to the left of the middle line of the body Its cavity is seen at *a*, *a*.

1. Ends of the bony arches of the last four lumbar vertebræ cut off.
2. The 21st, 22d, and 23d spinal nerves of the right side, cut off after they have penetrated the dura mater.
3. The dura mater at the part to which it was slit open to expose the spinal marrow and nerves.
4. The spinal marrow and cauda equina proceeding towards the apex of the tumour, expanding and attaching themselves to the walls of the sac.
5. The apex of the tumour, a thick firm substance, in which the spinal marrow, &c. terminate. Separated portions of it on each side, and from which many of the nerves arise, are represented at 6. 6. 6.

7. 7. 7. Perforations and ragged edges caused by ulceration.

8. The ascending filaments of the 23d nerve of the left side, both anterior and posterior, arising from the membranous expansion. The 23d nerve of the right side is concealed by the spinal marrow.

9. 9. Branches of the 24th nerve, and of the sacral nerves.

10. A part of the common skin, fat, muscles, &c. of the back.

Plate I. Vol. 4.